PLASTIC POWDER FILLED EPOXY PAINT FOR TUBING

BACKGROUND OF THE INVENTION

This invention relates to an improved epoxy paint for the covering of tubular shapes and relates to provisional application 60/124,751 which was filed March 17, 1999.

In the prior art, tubes have been coated with epoxy paint. Typically, a surface treatment is placed on the tube, and the paint surface then covers the surface treatment. Tubes are used in applications where they are exposed to corrosion, chipping, etc. Further the coating may have other characteristics that are not desirable. As an example, the tube may be bent after being formed and painted. The prior art have not always survived the bending to the extent that would be desired.

It has been known to utilize lacquer paints with plastic particle filler as a protective coating for steel sheet and strip products. However, it has not been proposed to utilize such plastic fillers in epoxy paints, and more specifically not epoxy paints for tubes.

SUMMARY OF THE INVENTION

In a disclosed embodiment of this invention, a tube is coated with an epoxy paint containing a percentage of plastic powder. The plastic particles are found in the final coating of the tube and provide several valuable characteristics. In particular, the plastic particles increase the resistance to chipping and corrosion. Also, the particles increase the ability of the tube to be bent and otherwise fabricated without flaking, cracking or damage of the coating. In summary, the plastic particles increase the strength of the coating and if necessary the thickness of the coating without compromising the adhesion of the final topcoat.

The powder-laden paint may be cured using various methods to produce the desired characteristics. Curing methods include but are not limited to induction, convection, infrared and radiant. Other variables in the control of the final coating characteristics include but are not limited to powder concentration; paint viscosity,

particle size and shape, and solvents employed. One such processing configuration results with the majority of the plastic particles on the surface of the topcoat creating an electrically insulating coating which is sometimes desired. If a electrically conductive surface is desired the paint can be cured to more evenly disperse the plastic particles throughout the dry film layer.

Preferably, the coating includes approximately 20% plastic particles by weight which is mixed into a fixed viscosity paint. Preferably the viscosity of the paint is low, and on the order of 20 to 30 seconds when measured with a No. 2 Zahn Cup.

More preferably, the powder particles are very small, and on the average less than 20 microns. Under certain applications, particles up to 50 microns on average may be utilized. In one preferred embodiment, a Nylon material is used for the particles. More preferably, the material is Nylon 11 or Nylon 12.

Larger size particles may be best for thicker coatings or a particular surface. As an example, if conductivity is desired on the final tube, larger particles may be utilized as they will tend not to coat the entire outer surface. The use of higher viscosity paint mixtures may also be used to achieve these desired conditions.

These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure l is a schematic of a tube painting line.

Figure 2 is a cross sectional view through the tube according to one embodiment of the present invention.

Figure 3 shows a second embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Figure 1 shows a tube forming line 20 including a tube rolling station 22. Tubing leaving the tube forming station 22 enters a paint bath 24, and then to a paint curing section 26. As known, bath 24 includes paint through which the tubing moves, and heat treatment station at which the paint is cured.

The paint bath preferably includes known epoxy paints for coating tubing. In particular, one known paint may include aluminum flakes. However, other known epoxy paints may be utilized within the teachings of this invention. Plastic particles preferably having a very small size are mixed into the paint bath. In one application the powders have an average size of less than 25 microns. In some applications, powders having average size of less than 50 microns may be utilized. The larger sizes are preferably utilized for thicker paint, or particular surface conductivity.

Preferably the plastic powder is mixed into the paint at about 20% by weight. The paint is preferably a fixed, controlled viscosity paint having a viscosity of between 20 and 30 seconds when measured with a No. 2 Zahn Cup.

As can be seen from Figure 2, the tubing 30 includes an underlying ferritic or non-ferritic tube 32 and may include an intermediate substrate 34. The intermediate substrate 34 is formed by any known surface treatment process. Examples are electroplated zinc or a hot dipped application of zinc based alloys.

The outer paint layer 36 is provided by the epoxy paint, which also includes plastic particles 38. In the Figure 2 embodiment, the plastic particles 38 are disbursed throughout the entire thickness of the paint layer 36. In this embodiment, the plastic particles 38 are disbursed throughout the entire thickness of the paint layer 36. In this embodiment, since the particles do not form a crust at the outer surface of the paint, the tube surface remains conductive.

The plastic particles provide valuable benefits, including increasing the resistance to chipping and corrosion, and allowing the tube to be bent without damage to the coating.

Figure 3 shows another embodiment tube 40 having an underlying steel surface 42. A substrate 44 is formed as in the previous embodiment. In the Figure 3 embodiment, the coating layer 46 has the bulk of the particles 48 move outwardly to form a crust at the outer surface of the coating layer. This crust will provide an electrically insulated barrier between a conductive inner tube material and potential ground paths from sources of electrical current.

The present invention provides an improved coating for tubing being painted by epoxy paint. Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content.